

Great Discoveries

For over 50 years, LLNL's unique combination of great minds, great tools, and a great location has fostered significant advances in science and engineering. Our engineers made contributions in 12 areas among the top 20 Engineering Achievements of the 20th Century, as compiled by the National Academy of Engineering.

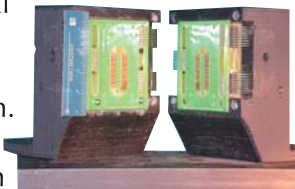
While we're proud of our past successes, Livermore engineers are staying focused on the future. What new technology breakthroughs might you be a part of? Take a look at some of the things we're working on right now:

The National Ignition Facility.

The largest laser system in the world, the 192-beam National Ignition Facility (NIF) will be used to compress and heat small targets to extreme temperatures and densities approaching those in the sun. NIF will be used to attain fusion ignition and energy gain in the laboratory, a critical step on the path towards limitless energy production. It is also a key element of the Stockpile Stewardship Program to maintain the U.S. nuclear deterrent without underground nuclear testing. Hundreds of engineers are involved in the design, building, and commissioning of NIF.

Biological Pathogen Detectors.

To support Homeland Security, LLNL scientists and engineers have been developing systems that can rapidly detect and identify biological agents, including pathogens such as anthrax and plague. As we work to develop the next generation of field-deployable instruments, we have designed and fabricated a new, inexpensive, low-power, convectively driven thermal chamber for polymerase chain reaction. This and other research will lead to instrumentation and methods that can provide more timely results, on the spot.



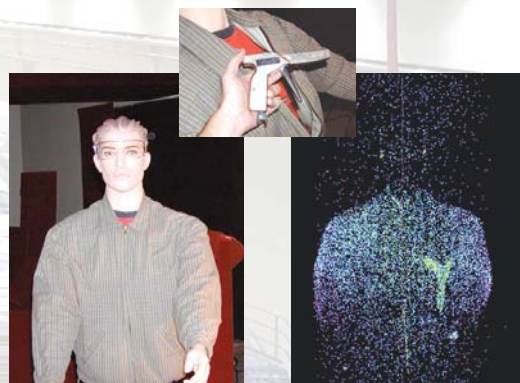
World's Most Powerful Diode-Pumped Laser.

We're developing a compact tool that rapidly uncovers and neutralizes land mines from a safe distance by using extremely powerful pulses of laser light. Developed by a team of Livermore physicists and engineers, the Diode-Pumped Pulsed Laser for Mine Clearing, pictured at right, won a 2004 R&D 100 Award for its promise of revolutionizing the practice of demining.



Terahertz Imaging and Spectroscopy.

The terahertz (THz) region of the electromagnetic (EM) spectrum, between microwaves and far infrared, is an emerging technology. Studies have shown that most materials exhibit unique EM signatures in the THz range. Our researchers are exploring the feasibility of using THz emissions to both image through barriers, pictured at right, and then to spectroscopically characterize the imaged substances to detect terrorist materials. THz technology has the potential to provide new capabilities in remote imaging and characterization of suspect materials, particularly explosives.



"One of the Laboratory's great strengths is its ability to form flexible interdisciplinary teams of scientists and engineers to turn visionary ideas and cutting-edge technology into realistic systems. Excellence in engineering is essential for us to fulfill our vital mission for the nation."



—Dr. Cherry A. Murray
Deputy Director for Science & Technology, LLNL
Member, National Academies of Science
and National Academies of Engineering
Winner, American Physical Society Pake Prize 2005